



HEXAGON TRANSPORTATION CONSULTANTS, INC.

Memorandum

Date: August 12, 2014
To: Karen Mack, City of San Jose
Cc: Mirjam Link, Boston Properties
From: Gary Black & Robert Del Rio
Subject: 2890 North First Street Commercial Traffic Operations

Introduction

Hexagon Transportation Consultants, Inc. has completed a traffic operations analysis for the proposed 2890 North First Street commercial development in North San Jose, California. The 24-acre project site is generally bordered by Daggett Drive on the north, Plumeria Drive on the south, North First Street on the west, and Zanker Road on the east. The site location is indicated in Figure 1. Two possible development schemes are being considered. Scheme A would involve constructing six commercial buildings including 1,313,483 s.f. of office space and 110,000 s.f. of retail space with three above ground parking structures in three phases. Scheme B would involve constructing seven commercial buildings including 1,554,448 s.f. of office space with 110,000 s.f. of retail space with two above ground parking structures and two below ground parking structures. Scheme A and B would be built in three and two phases, respectively. Full buildout of both development schemes were evaluated for potential traffic operational issues.

The project site is located within the North San Jose Development Policy (NSJDP) boundary, and is covered by the completed and approved NSJDP Environmental Impact Report (EIR). As such, the project is not required to prepare a traffic impact analysis report. However, the project is required to prepare supplemental operations analysis. The purpose of the traffic operations analysis is to determine whether the added traffic due to the proposed project would create operational problems on the roadway system in the immediate area of the project site and at its access points.

The project has frontage along Zanker Road, which is planned to be widened to 6 lanes as part of the NSJDP transportation improvements. The City of San Jose has prepared a plan line study for the Zanker Road widening. No additional right-of-way will be required along the project frontage. The existing right-of-way already is wide enough to allow for the increased number of lanes.

Scope of Study

The study focuses on traffic operations with the proposed development at the access points to the site and consists of signal warrant checks and vehicle queue analysis. Transit, pedestrian, and bicycle access also are discussed. Transportation conditions were evaluated for the following scenarios:

Existing Conditions. Existing traffic volumes were obtained from the City of San Jose and supplemented with new AM and PM peak hour counts at each of the study intersections.

Existing Plus Project Conditions. Project-generated traffic was added to existing AM and PM peak-hour volumes.

Background Conditions. The total approved trips in the area were added to the existing AM and PM peak-hour volumes to obtain traffic volumes for background conditions.

Background Plus Project Conditions. Project trips were added to background traffic volumes.

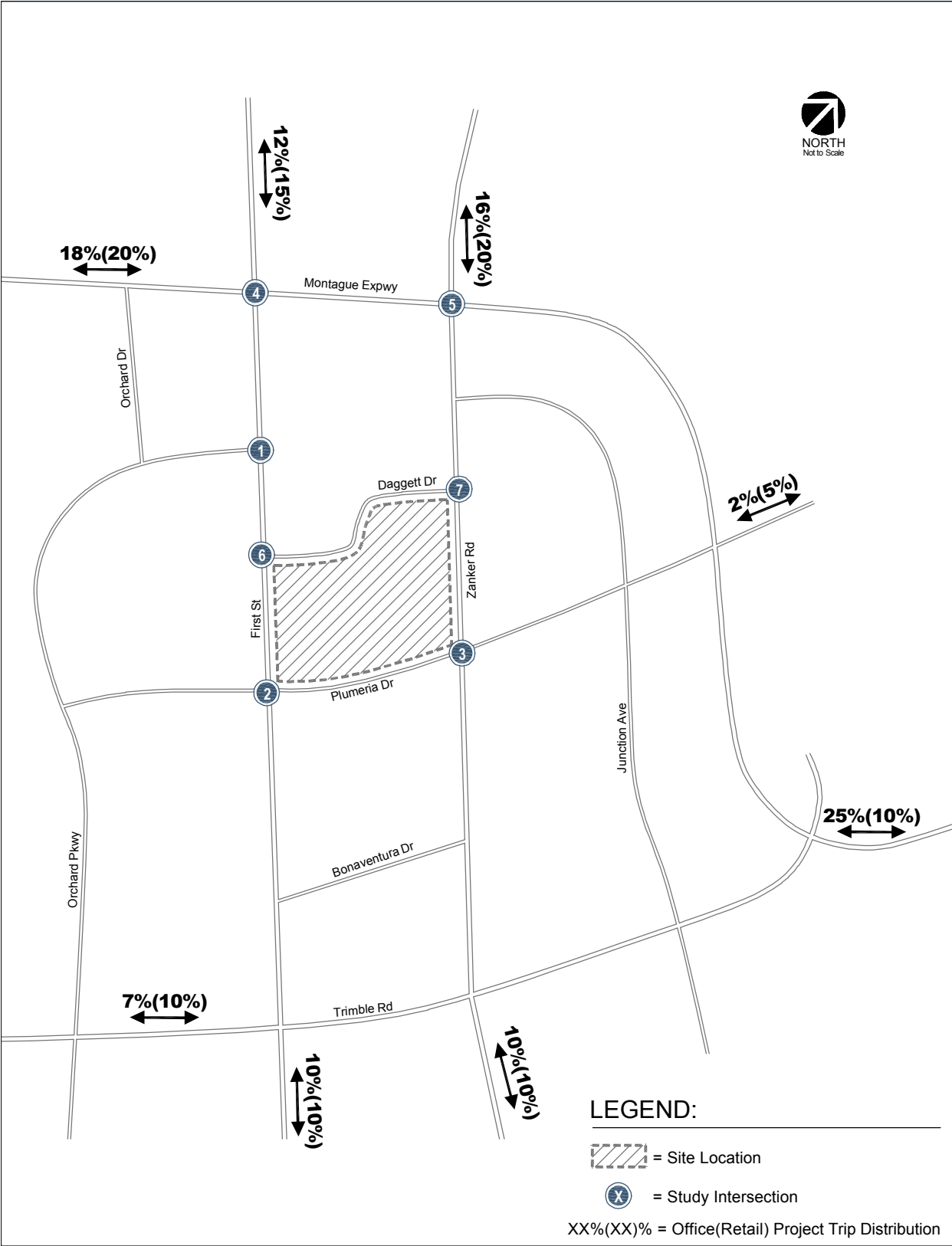


Figure 1
Site Location, Study Intersections, and Trip Distribution

Trip Generation, Distribution, and Assignment

Trip Generation

The magnitude of traffic generated by the proposed project was estimated by applying to the size of the development the applicable trip generation rates recommended by the City of San Jose *Traffic Impact Analysis Handbook: Volume 1 – Methodologies and Requirements*, 2009. Based on the recommended rates, it is estimated that Scheme A would generate 17,489 daily trips with 2,018 AM peak-hour trips (1,790 inbound trips and 229 outbound trips) and 2,156 PM peak-hour trips (436 inbound trips and 1,721 outbound trips). Scheme B would generate 19,909 daily trips with 2,375 AM peak-hour trips (2,105 inbound trips and 270 outbound trips) and 2,497 PM peak-hour trips (488 inbound trips and 2,009 outbound trips). The project trip generation estimates are presented in Table 1.

Trip Distribution and Assignment

The directional distribution and assignment of site-generated traffic to and from the main gateways to the project area are shown in Figure 1. The distribution was developed based on existing traffic patterns and the location of complimentary land uses. Figures 2 and 3 show the resulting project trips added to the study intersections.

Intersection Queuing Analysis

The vehicular queuing analysis is based on vehicle queuing for high demand turning movements at intersections that provide primary access to the project area. Vehicle queues were estimated using a Poisson probability distribution, which estimates the probability of “n” vehicles for a vehicle movement using the following formula:

$$P(x=n) = \frac{\lambda^n e^{-\lambda}}{n!}$$

Where:

$P(x=n)$ = probability of “n” vehicles in queue per lane

n = number of vehicles in the queue per lane

λ = Average number of vehicles in the queue per lane (vehicles per hour per lane/signal cycles per hour)

The basis of the analysis is as follows: (1) the Poisson probability distribution is used to estimate the 95th percentile maximum number of queued vehicles per cycle for a particular movement; (2) the estimated maximum number of vehicles in the queue is translated into a queue length, assuming 25 feet per vehicle; and (3) the estimated maximum queue length is compared to the existing or planned available storage capacity for the movement. This analysis thus provides a basis for estimating future left-turn storage requirements at intersections. The 95th percentile queue length value indicates that during the peak hour, a queue of this length or less would occur on 95 percent of the signal cycles. Likewise, a queue length larger than the 95th percentile queue would only occur on 5 percent of the signal cycles (about 3 cycles during the peak hour for a signal with a 60-second cycle length). Therefore, left-turn storage pocket designs based on the 95th percentile queue length would ensure that storage space would be exceeded only 5 percent of the time. The 95th percentile queue length is also known as the “design queue length”.

The operations analysis includes an evaluation of vehicular queues at intersections that provide primary access to the immediate project area for each of the scenarios studied. Results of the analysis are summarized in Table 2. One of the intersections adjacent to the project site would experience queuing deficiencies that would need to be addressed. These are described below. The intersection of First Street and Montague Expressway is also shown to have inadequate queue storage, but this problem would not be exacerbated by the project.

Table 1
Trip Generation Estimates

Land Use	Size	Daily Trip Rate	Daily Trips	Pk-Hr %	AM Peak Hour					Pk-Hr %	PM Peak Hour				
					Splits		Trips				Splits		Trips		
					In	Out	In	Out	Total		In	Out	In	Out	Total
Scheme A															
General Office Building /a/	1,313,483 s.f.	11.00	14,448	14%	88%	12%	1,780	243	2,023	14%	17%	83%	344	1,679	2,023
3% Transit Reduction /b/			-433				-53	-7	-61				-10	-50	-61
3% Mixed-Use Reduction /c/			-420				-53	-7	-60				-10	-49	-59
Retail /a/	110,000 s.f.	40.00	4,400	4%	70%	30%	123	53	176	9%	50%	50%	198	198	396
3% Mixed-Use Reduction /c/			-420				-7	-53	-60				-49	-10	-59
25% PM Pass-By Reduction /d/			-84										-37	-47	-84
Net Project Trips at Site Access Points /e/			17,574				1,790	229	2,018				473	1,768	2,241
Net New Project Trips			17,489				1,790	229	2,018				436	1,721	2,156
Scheme B															
General Office Building /a/	1,554,448 s.f.	11.00	17,099	14%	88%	12%	2,107	287	2,394	14%	17%	83%	407	1,987	2,394
3% Transit Reduction /b/			-513				-63	-9	-72				-12	-60	-72
3% Mixed-Use Reduction /c/			-498				-53	-8	-61				-12	-58	-70
Retail /a/	110,000 s.f.	40.00	4,400	4%	70%	30%	123	53	176	9%	50%	50%	198	198	396
3% Mixed-Use Reduction /c/			-498				-8	-53	-61				-58	-12	-70
25% PM Pass-By Reduction /d/			-82										-35	-47	-82
Net Project Trips at Site Access Points /e/			19,991				2,105	270	2,375				523	2,056	2,579
Net New Project Trips			19,909				2,105	270	2,375				488	2,009	2,497
/a/ City of San Jose Traffic Impact Analysis Handbook: Volume 1 - Methodologies and Requirements, 2009. /b/ 3% transit reduction for employment located within 2,000-foot walking distance from a LRT Station as recommended by VTA Transportation Impact Analysis Guidelines, Updated March 2009. /c/ As prescribed by the Transportation Impact Analysis Guidelines from VTA (March 2009), the maximum trip reduction for mixed-use development project with employment and employee-serving retail components is equal to 3% off the employment component. /d/ A pass-by reduction of 25% is typically applied to retail development within Santa Clara County. /e/ Trips do not include the pass-by trip reduction for retail.															

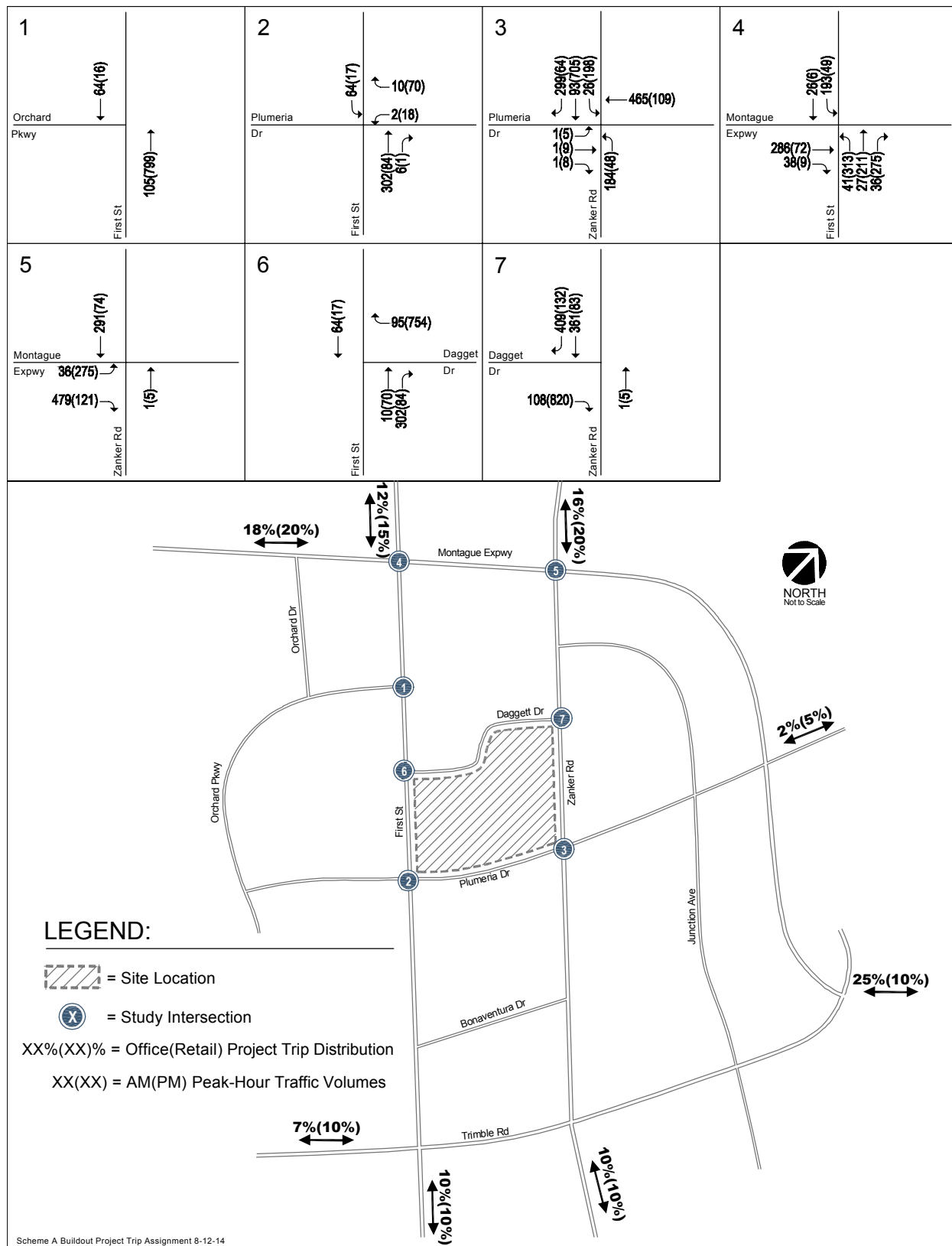


Figure 2
Project Trip Assignment (Scheme A)



Table 2
Intersection Vehicular Queuing Summary

	First/ Orchard	First/ Orchard	First/ Plumeria	First/ Plumeria	First/ Plumeria	First/ Plumeria	Zanker/ Plumeria	Zanker/ Plumeria	Zanker/ Plumeria	Zanker/ Plumeria	Zanker/ Plumeria	Zanker/ Plumeria
	NBL AM	NBL PM	WBL AM	WBL PM	SBL AM	SBL PM	SBL AM	SBL PM	EBL AM	EBL PM	NBL AM	NBL PM
Existing Conditions												
Cycle/Delay ¹ (sec)	84	140	140	140	140	140	106	106	106	106	106	106
Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Volume (vph)	26	16	25	50	34	42	47	25	8	11	72	4
Volume (vphpl)	26	16	25	50	34	42	47	25	8	11	72	4
Avg. Queue (veh/ln.)	0.6	0.6	1.0	1.9	1.3	1.6	1.4	0.7	0.2	0.3	2.1	0.1
Avg. Queue ² (ft./ln.)	15	16	24	49	33	41	35	18	6	8	53	3
95th % Queue (veh/ln.)	2	2	3	4	3	4	4	2	1	1	5	1
95th % Queue (ft./ln.)	50	50	75	100	75	100	100	50	25	25	125	25
Storage (ft./ln.)	200	200	225	225	225	225	200	200	250	250	250	250
Adequate (Y/N)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Background Conditions												
Cycle/Delay ¹ (sec)	84	140	140	140	140	140	106	106	106	106	106	106
Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Volume (vph)	34	27	41	93	60	63	73	28	28	18	87	22
Volume (vphpl)	34	27	41	93	60	63	73	28	28	18	87	22
Avg. Queue (veh/ln.)	0.8	1.1	1.6	3.6	2.3	2.5	2.1	0.8	0.8	0.5	2.6	0.6
Avg. Queue ² (ft./ln.)	20	26	40	90	58	61	54	21	21	13	64	16
95th % Queue (veh/ln.)	2	3	4	7	5	5	5	3	3	2	5	2
95th % Queue (ft./ln.)	50	75	100	175	125	125	125	75	75	50	125	50
Storage (ft./ln.)	200	200	225	225	225	225	200	200	250	250	250	250
Adequate (Y/N)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Existing Plus Scheme A Project Conditions												
Cycle/Delay ¹ (sec)	84	140	140	140	140	140	106	106	106	106	106	106
Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Volume (vph)	26	16	27	68	98	59	73	223	9	16	256	52
Volume (vphpl)	26	16	27	68	98	59	73	223	9	16	256	52
Avg. Queue (veh/ln.)	0.6	0.6	1.1	2.6	3.8	2.3	2.1	6.6	0.3	0.5	7.5	1.5
Avg. Queue ² (ft./ln.)	15	16	26	66	95	57	54	164	7	12	188	38
95th % Queue (veh/ln.)	2	2	3	6	7	5	5	11	1	2	12	4
95th % Queue (ft./ln.)	50	50	75	150	175	125	125	275	25	50	300	100
Storage (ft./ln.)	200	200	225	225	225	225	200	200	250	250	250	250
Adequate (Y/N)	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES
Background Plus Scheme A Project Conditions												
Cycle/Delay ¹ (sec)	84	140	140	140	140	140	106	106	106	106	106	106
Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Volume (vph)	34	27	43	111	124	80	99	226	29	23	271	70
Volume (vphpl)	34	27	43	111	124	80	99	226	29	23	271	70
Avg. Queue (veh/ln.)	0.8	1.1	1.7	4.3	4.8	3.1	2.9	6.7	0.9	0.7	8.0	2.1
Avg. Queue ² (ft./ln.)	20	26	42	108	121	78	73	166	21	17	199	52
95th % Queue (veh/ln.)	2	3	4	8	9	6	6	11	3	2	13	5
95th % Queue (ft./ln.)	50	75	100	200	225	150	150	275	75	50	325	125
Storage (ft./ln.)	200	200	225	225	225	225	200	200	250	250	250	250
Adequate (Y/N)	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES
Existing Plus Scheme B Project Conditions												
Cycle/Delay ¹ (sec)	84	140	140	140	140	140	106	106	106	106	106	106
Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Volume (vph)	26	16	30	85	109	61	77	253	9	17	224	45
Volume (vphpl)	26	16	30	85	109	61	77	253	9	17	224	45
Avg. Queue (veh/ln.)	0.6	0.6	1.2	3.3	4.2	2.4	2.3	7.4	0.3	0.5	6.6	1.3
Avg. Queue ² (ft./ln.)	15	16	29	83	106	59	57	186	7	13	165	33
95th % Queue (veh/ln.)	2	2	3	7	8	5	5	12	1	2	11	3
95th % Queue (ft./ln.)	50	50	75	175	200	125	125	300	25	50	275	75
Storage (ft./ln.)	200	200	225	225	225	225	200	200	250	250	250	250
Adequate (Y/N)	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES
Background Plus Scheme B Project Conditions												
Cycle/Delay ¹ (sec)	84	140	140	140	140	140	106	106	106	106	106	106
Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Volume (vph)	34	27	46	128	135	82	103	256	29	24	239	63
Volume (vphpl)	34	27	46	128	135	82	103	256	29	24	239	63
Avg. Queue (veh/ln.)	0.8	1.1	1.8	5.0	5.3	3.2	3.0	7.5	0.9	0.7	7.0	1.9
Avg. Queue ² (ft./ln.)	20	26	45	124	131	80	76	188	21	18	176	46
95th % Queue (veh/ln.)	2	3	4	9	9	6	6	12	3	2	12	4
95th % Queue (ft./ln.)	50	75	100	225	225	150	150	300	75	50	300	100
Storage (ft./ln.)	200	200	225	225	225	225	200	200	250	250	250	250
Adequate (Y/N)	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES

¹ Vehicle queue calculations based on cycle length for signalized intersections and controlled delay for unsignalized intersections.

² Assumes 25 feet per vehicle queued

Table 2
Intersection Vehicular Queuing Summary

	First/ Montague	First/ Montague	First/ Montague	First/ Montague	Zanker/ Montague	Zanker/ Montague	Zanker/ Montague	Zanker/ Montague	First/ Dagget	First/ Dagget	Zanker/ Dagget	Zanker/ Dagget
Measurement	NBL AM	NBL PM	SBL AM	SBL PM	EBL AM	EBL PM	WBL AM	WBL PM	WBR AM	WBR PM	EBR AM	EBR PM
Existing Conditions												
Cycle/Delay ¹ (sec)	180	190	180	190	190	190	190	190	10.7	9.6	9.1	12.2
Lanes	2	2	2	2	2	2	2	2	1	1	1	1
Volume (vph)	303	406	39	254	360	251	39	43	10	25	11	37
Volume (vphpl)	152	203	20	127	180	126	20	22	10	25	11	37
Avg. Queue (veh/ln.)	7.6	10.7	1.0	6.7	9.5	6.6	1.0	1.1	0.0	0.1	0.0	0.1
Avg. Queue ² (ft./ln.)	189	268	24	168	238	166	26	28	1	2	1	3
95th % Queue (veh/ln.)	12	16	3	11	15	11	3	3	1	1	1	1
95th % Queue (ft./ln.)	300	400	75	275	375	275	75	75	25	25	25	25
Storage (ft./ln.)	350	350	300	300	550	550	250	250	--	--	--	--
Adequate (Y/N)	YES	NO	YES	YES	YES	YES	YES	YES	--	--	--	--
Background Conditions												
Cycle/Delay ¹ (sec)	180	190	180	190	190	190	190	190	13.1	10.8	10.0	14.0
Lanes	2	2	2	2	2	2	2	2	1	1	1	1
Volume (vph)	334	509	72	320	455	269	43	47	10	25	11	37
Volume (vphpl)	167	255	36	160	228	135	22	24	10	25	11	37
Avg. Queue (veh/ln.)	8.4	13.4	1.8	8.4	12.0	7.1	1.1	1.2	0.0	0.1	0.0	0.1
Avg. Queue ² (ft./ln.)	209	336	45	211	300	177	28	31	1	2	1	4
95th % Queue (veh/ln.)	13	20	4	13	18	12	3	3	1	1	1	1
95th % Queue (ft./ln.)	325	500	100	325	450	300	75	75	25	25	25	25
Storage (ft./ln.)	350	350	300	300	550	550	250	250	--	--	--	--
Adequate (Y/N)	YES	NO	YES	NO	YES	YES	YES	YES	--	--	--	--
Existing Plus Scheme A Project Conditions												
Cycle/Delay ¹ (sec)	180	190	180	190	190	190	190	190	13.5	77.8	13.6	403.9
Lanes	2	2	2	2	2	2	2	2	1	1	1	1
Volume (vph)	344	719	232	303	396	526	39	43	105	779	119	857
Volume (vphpl)	172	360	116	152	198	263	20	22	105	779	119	857
Avg. Queue (veh/ln.)	8.6	19.0	5.8	8.0	10.5	13.9	1.0	1.1	0.4	16.8	0.4	96.2
Avg. Queue ² (ft./ln.)	215	474	145	200	261	347	26	28	10	421	11	2404
95th % Queue (veh/ln.)	14	26	10	13	16	20	3	3	2	24	2	156
95th % Queue (ft./ln.)	350	650	250	325	400	500	75	75	50	600	50	3900
Storage (ft./ln.)	350	350	300	300	550	550	250	250	--	--	--	--
Adequate (Y/N)	YES	NO	YES	NO	YES	YES	YES	YES	--	--	--	--
Background Plus Scheme A Project Conditions												
Cycle/Delay ¹ (sec)	180	190	180	190	190	190	190	190	18.5	183.5	16.2	599.2
Lanes	2	2	2	2	2	2	2	2	1	1	1	1
Volume (vph)	375	822	265	369	491	544	43	47	105	779	119	857
Volume (vphpl)	188	411	133	185	246	272	22	24	105	779	119	857
Avg. Queue (veh/ln.)	9.4	21.7	6.6	9.7	13.0	14.4	1.1	1.2	0.5	39.7	0.5	142.6
Avg. Queue ² (ft./ln.)	234	542	166	243	324	359	28	31	13	993	13	3566
95th % Queue (veh/ln.)	15	30	11	15	19	21	3	3	2	50	2	144
95th % Queue (ft./ln.)	375	750	275	375	475	525	75	75	50	1250	50	3600
Storage (ft./ln.)	350	350	300	300	550	550	250	250	--	--	--	--
Adequate (Y/N)	NO	NO	YES	NO	YES	YES	YES	YES	--	--	--	--
Existing Plus Scheme B Project Conditions												
Cycle/Delay ¹ (sec)	180	190	180	190	190	190	190	190	14.9	161.7	14.0	257.2
Lanes	2	2	2	2	2	2	2	2	1	1	1	1
Volume (vph)	352	771	265	309	402	572	39	43	130	957	95	690
Volume (vphpl)	176	386	133	155	201	286	20	22	130	957	95	690
Avg. Queue (veh/ln.)	8.8	20.3	6.6	8.2	10.6	15.1	1.0	1.1	0.5	43.0	0.4	49.3
Avg. Queue ² (ft./ln.)	220	509	166	204	265	377	26	28	13	1075	9	1232
95th % Queue (veh/ln.)	14	28	11	13	16	22	3	3	2	54	2	61
95th % Queue (ft./ln.)	350	700	275	325	400	550	75	75	50	1350	50	1525
Storage (ft./ln.)	350	350	300	300	550	550	250	250	--	--	--	--
Adequate (Y/N)	YES	NO	YES	NO	YES	YES	YES	YES	--	--	--	--
Background Plus Scheme B Project Conditions												
Cycle/Delay ¹ (sec)	180	190	180	190	190	190	190	190	21.7	301.9	16.6	415.3
Lanes	2	2	2	2	2	2	2	2	1	1	1	1
Volume (vph)	383	874	298	375	497	590	43	47	130	957	95	690
Volume (vphpl)	192	437	149	188	249	295	22	24	130	957	95	690
Avg. Queue (veh/ln.)	9.6	23.1	7.5	9.9	13.1	15.6	1.1	1.2	0.8	80.3	0.4	79.6
Avg. Queue ² (ft./ln.)	239	577	186	247	328	389	28	31	20	2006	11	1990
95th % Queue (veh/ln.)	15	31	12	15	19	22	3	3	2	95	2	95
95th % Queue (ft./ln.)	375	775	300	375	475	550	75	75	50	2375	50	2375
Storage (ft./ln.)	350	350	300	300	550	550	250	250	--	--	--	--
Adequate (Y/N)	NO	NO	YES	NO	YES	YES	YES	YES	--	--	--	--

¹ Vehicle queue calculations based on cycle length for signalized intersections and controlled delay for unsignalized intersections.

² Assumes 25 feet per vehicle queued

Zanker Road and Plumeria Drive

The queuing analysis indicates that the maximum vehicle queues for northbound and southbound left-turn movements at the Zanker Road and Plumeria Drive intersection would exceed the existing vehicle storage capacity under project conditions during one of the peak hours.

The northbound left-turn lane currently provides approximately 250 feet of vehicle storage, which can accommodate approximately ten vehicles. The estimated 95th percentile vehicle queue for the northbound left-turn movement is projected to be as much as 13 vehicles under Scheme A and 12 vehicles under Scheme B during the AM peak hour under background plus project conditions, exceeding the existing storage capacity by up to 3 vehicles, or 75 feet.

Recommendation: The northbound left-turn lane at the Zanker Road and Plumeria Drive intersection could be extended the necessary 75 feet (see Figure 4). Alternatively, a left-turn lane from northbound Zanker Road into the project site at either Driveway 2 or Daggett Drive could be pursued. The feasibility of a left-turn lane would be questionable given the existing pump station within the median of Zanker Road. The pump station would create sight distance issues for uncontrolled left-turn movements along Zanker Road from a point south of the pump station. Therefore, it would be preferable to locate a potential left-turn lane on Zanker Road at Daggett Drive rather than Driveway 2 (see Figure 5).

The southbound left-turn lane currently provides approximately 200 feet of vehicle storage, which can accommodate approximately eight vehicles. The estimated 95th percentile vehicle queue for the southbound left-turn movement is projected to be as much as 11 vehicles under Scheme A and 12 vehicles under Scheme B during the PM peak hour under background plus project conditions, exceeding the existing storage capacity by up to 4 vehicles, or 100 feet.

Recommendation: The southbound lane should be extended the necessary 75 feet under Scheme A or 100 feet under Scheme B to accommodate the projected queues (see Figure 4).

Site Access

A review of site plans for both development schemes was performed to determine if adequate site access is provided and to identify any access and circulation issues that should be improved. This review is based on generally accepted traffic engineering standards.

Driveway Access

Based on the proposed site plans for both Schemes A and B shown in Figures 6 and 7, respectively, access to the project site and each of the proposed parking garages will be provided via entrances along Daggett Drive, Zanker Road, and Plumeria Drive. No direct access to the project site will be provided from North First Street. One right-turn only access point will be located along Zanker Road (Access Point 1). Four driveways will provide access to the site from Plumeria Drive (Access Points 2 through 5). Each of the entrances along Plumeria Drive is proposed to provide full access with the exception of the entrance located closest to Zanker Road. Access to seven entrances along Daggett Drive (Access Points 6 through 12) would be provided via the existing right-turn only intersections of Daggett Drive with North First Street and Zanker Road. Figures 6 and 7 show the estimated traffic volume at each of the driveways. Hexagon checked the volume and determined that all driveways would work fine without any additional controls, except for the intersections of Daggett Drive with North First Street and Zanker Road, which is discussed below. Each driveway was checked for sight distance, and it was determined that adequate sight distance exists at each location.

Daggett Drive Access

It is assumed that the majority of project traffic will utilize the intersections of Daggett Drive with North First Street and Zanker Road as ingress and egress points given the many access points along Daggett Drive and location of parking on the project site. The large projected outbound right-turn volume at the North First Street and Daggett Drive intersection along with heavy northbound traffic flow along North First Street will cause lengthy queues and delays for vehicles exiting the project site during the PM peak hour.

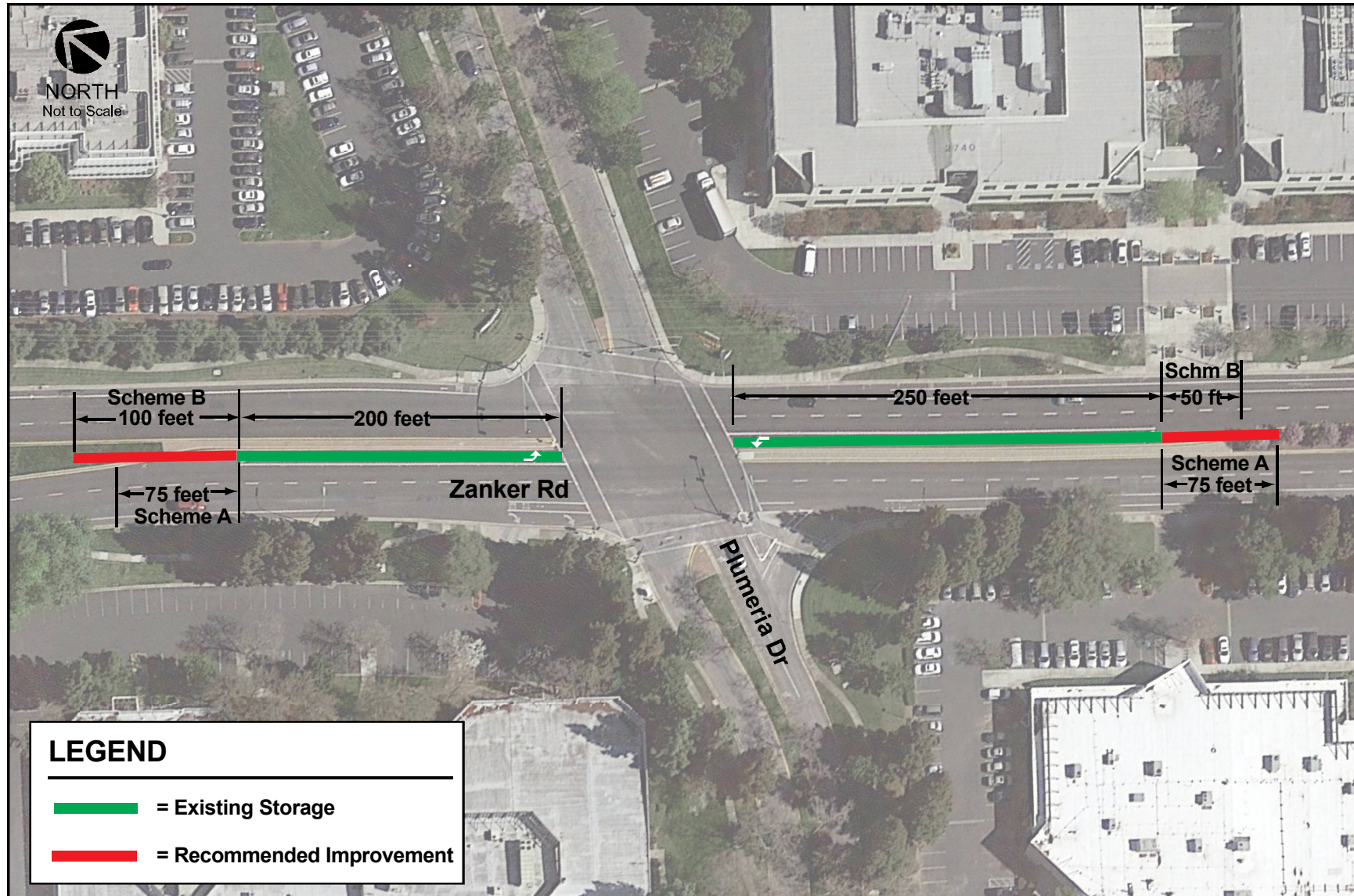


Figure 4
Zanker Road and Plumeria Drive Improvements

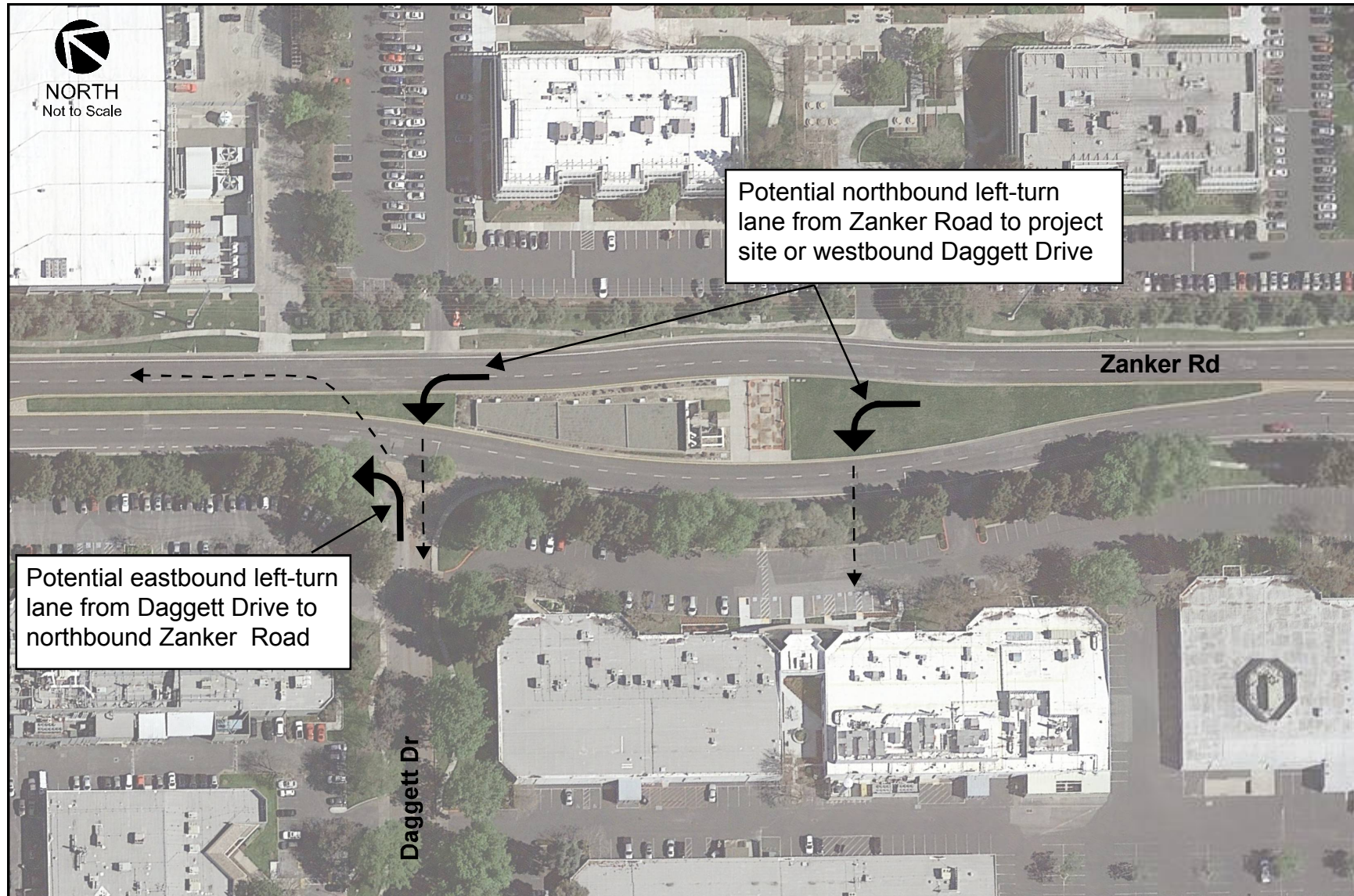


Figure 5
Potential Zanker Road Left-Turn Locations

Providing an alternate exit point to northbound Zanker Road from Daggett Drive would reduce delays for exiting vehicles from the project site. The implementation of an outbound left-turn lane from Daggett Drive to northbound Zanker Road would necessitate a break in the median along Zanker Road at Daggett Drive and signalization of the intersection (see Figure 5).

Signal Warrant Analysis (Access Point 4)

Access Point 4 was evaluated for potential signalization. The need for signalization of an unsignalized intersection is assessed based on the Peak Hour Volume Warrant (Warrant 3) described in the *California Manual on Uniform Traffic Control Devices for Streets and Highways (CA MUTCD)*, Part 4, Highway Traffic Signals, 2010.

The results of the peak-hour traffic signal warrant checks indicate that Access Point 4 would not have traffic volumes that meet thresholds that warrant signalization with the traffic associated with either development Scheme A or B. Queue estimates indicate no more than one vehicle at Access Point 4.

Bicycle Access

Currently, bicycle facilities are found along various roadways in the vicinity of the project site including Orchard Parkway, North First Street, and Zanker Road. The City of San Jose is planning to add buffered bike lanes to Plumeria Drive, including along the project frontage. The Plumeria Drive bike lanes will promote non-auto modes of transportation in the City and to accommodate bicycle travel near the project site.

Recommendation: Frontage improvements on Plumeria Drive will be needed to accommodate the planned bicycle lanes. Plumeria Drive will need to be widened by approximately 12 feet across the project frontage. Hexagon does not know whether this widening will require additional right-of-way.

Pedestrian Access

There are sidewalks provided along the entirety of the project frontages along North First Street, Zanker Road, and Plumeria Drive. A continuous sidewalk is provided along the east side of North First Street between Plumeria Drive and Orchard Parkway. The signalized intersection of North First Street and Orchard Parkway provides a controlled pedestrian crossing and access to the LRT Station. Adequate pedestrian facilities are provided to the project site, and no improvements are necessary.

Transit Service

The project site is served directly by the Orchard Parkway LRT Station, which is located less than 700 feet north along North First Street and within a reasonable walking distance of the project site. The project site is adequately served by existing transit services, and no improvements are necessary.

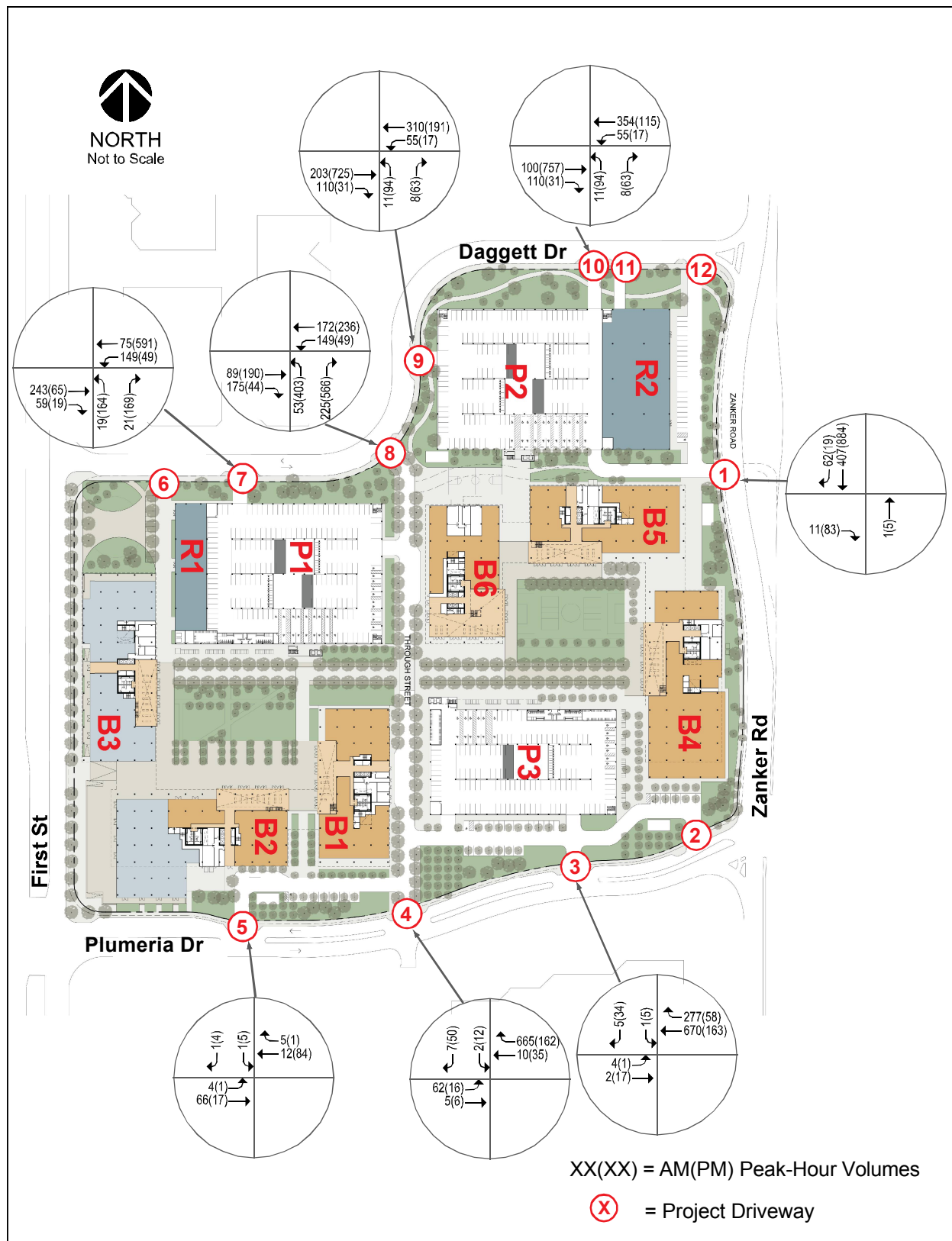


Figure 6
Project Access Point Volumes (Scheme A)

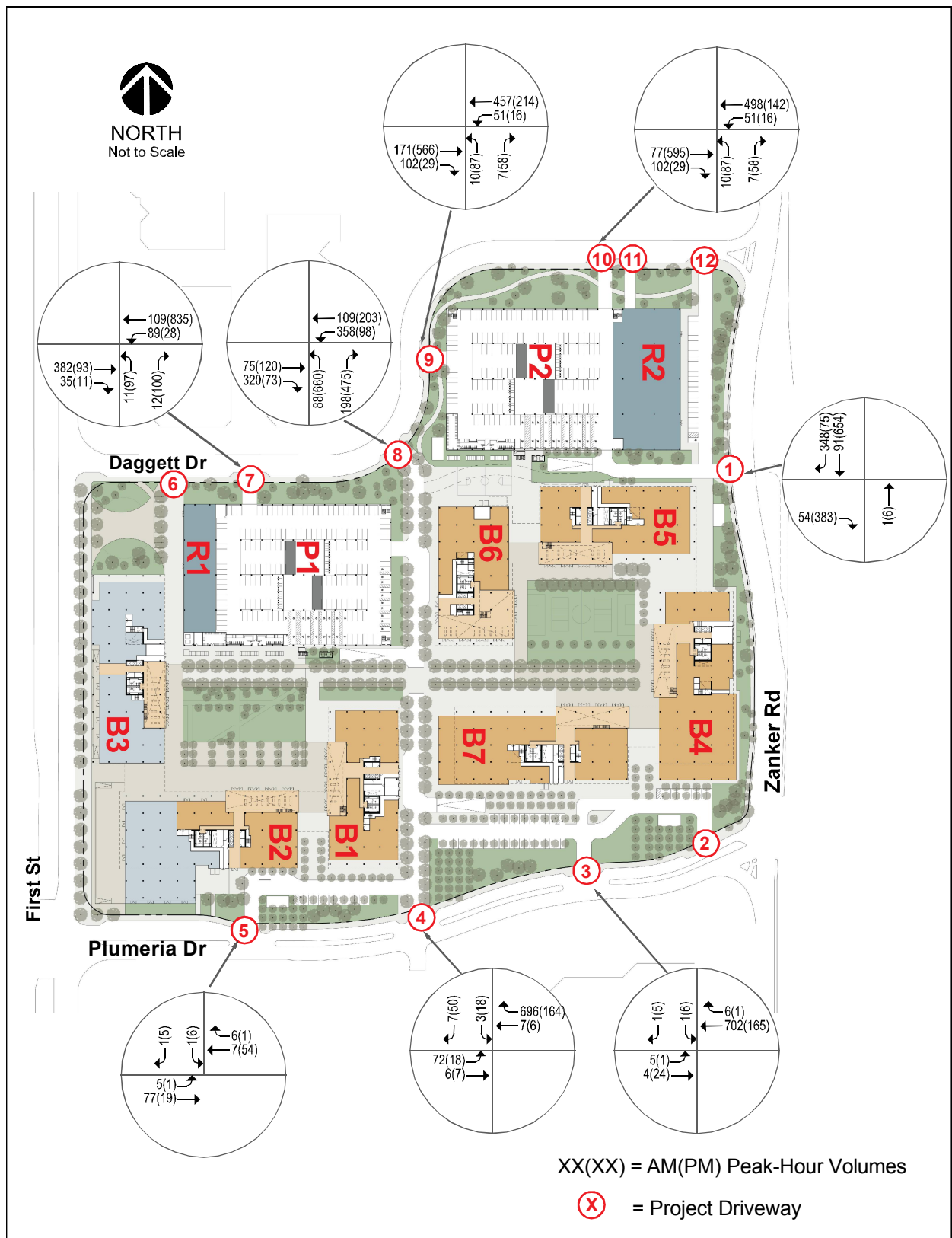


Figure 7
Project Access Point Volumes (Scheme B)

Conclusions and Recommendations

Based on the operations analysis the following improvements are recommended to serve the projected traffic volumes due to the proposed development at 2890 North First Street:

- Access Point 4 does not meet peak hour volume thresholds to warrant signalization.
- Frontage improvements on Plumeria Drive will be needed to accommodate planned bicycle lanes plus the access improvements. Plumeria Drive will need to be widened by approximately 12 feet across the project frontage. Hexagon does not know whether this widening will require additional right-of-way.
- The northbound left-turn lane at the Zanker Road and Plumeria Drive intersection should be extended 75 feet to accommodate the projected queues. Alternatively, a left-turn lane from northbound Zanker Road into the project site at either Driveway 2 or Daggett Drive could be pursued. The feasibility of a left-turn lane would be questionable given the existing pump station within the median of Zanker Road. The pump station would create sight distance issues for uncontrolled left-turn movements along Zanker Road from a point south of the pump station. Therefore, it would be preferable to locate a potential left-turn lane on Zanker Road at Daggett Drive rather than Driveway 2.
- The southbound left-turn lane on Zanker Road at Plumeria Drive should be extended 75 feet under Scheme A or 100 feet under Scheme B to accommodate the projected queues.
- Projected traffic volumes indicate that Daggett Drive will serve the majority of inbound and outbound project traffic to and from the north. Traffic flow along northbound North First Street may cause delays for vehicles exiting the project site at Daggett Drive. Delays for exiting vehicles from the project site could be reduced with access to northbound Zanker Road. Access to northbound Zanker Road would necessitate a break in the median along Zanker Road at Daggett Drive. Left-turn access from Daggett Drive to northbound Zanker Road would require the installation of a signal.